PROPERTIES OF MOON PSRs from LEND/LRO DATA. M.L. Litvak[1], I. G. Mitrofanov [1], A. B. Sanin [1] ,W. V. Boynton [2], G. Chin [3], J. B. Garvin [3], D. Golovin [1], L. G. Evans [4], K. Harshman [2], A. S. Kozyrev [1], A. Malakhov [1], T. McClanahan [3], G. Milikh [5], M. Mokrousov [1], G. Nandikotkur [5], I. Nuzhdin[1], R. Sagdeev [5], V. Shevchenko [7], V. Shvetsov [8], D. E. Smith [9], R. Starr [6], V. I. Tretyakov [1], J. Trombka[5], A. Varennikov [1], A. Vostrukhin [1] and M. T. Zuber [9], [1]**Space Research Institute, RAS, Moscow, 117997, Russia, litvak@mx.iki.rssi.ru,** [2]University of Arizona, Tucson, AZ USA , [3]NASA Goddard Space Flight Center, Greenbelt, MD USA, [4]Computer Science Corporation, Greenbelt, MD USA, [5]University of Maryland, College Park, MD USA, [6]Catholic University, Washington DC, USA, [7]Sternberg Astronomical Institute of Moscow State University, Moscow, Russia, [8]Joint Institute of Nuclear Energy, Dubna, Russia, [9]Massachusetts Institute of Technology, Cambridge, MA USA

Introduction: Radar and neutron spectroscopy measurements onboard Clementine and Lunar Prospector spacecrafts revealed indications that deposits of pure water ice might exist in permanently shadowed regions (PSRs) near the lunar south pole [1]. In particular Lunar Prospector Neutron Spectrometer (LPNS) discovered a significant suppression of epithermal neutrons around the both lunar poles above 70° latitude. This effect was interpreted as a possible signature of hydrogen enhancement or even presence of water ice distributed within PSRs areas [2-4].

In our analysis we plan to use Lunar Exploration Neutron Detector (LEND) data to look at distribution of neutron flux at Moon poles with much better spatial resolution then was achieved at previous space missions. LEND is a collimated neutron spectrometer onboard LRO spacecraft which is capable to distinguish footprint with radius ~ 5 km [5-6]. It is comparable with large PSRs and provides unique possibility to test hypothesis if all major PSRs are reservoirs of Hydrogen or even water ice.

Data Analysis: In our analysis we plan to process LEND data gathered in collimated detectors of epithermal neutrons from July, 2 2009 up to June, 1 2011. Using these data we would like to accomplish statistical comparison between distribution of neutron flux inside and outside PSRs. It includes:

1) Collective estimation approach to test all known large PSRs in order to estimate significance of average local variations of neutron flux inside and outside PSR area.
2) Sampling approach to test average neutron suppression for different sets of PSRs selected by various criteria such as area, exposure time, location and etc.
3) Individual approach to test properties of particular PSRs with well visible effect of neutron suppression.

Discussion: First LEND results already shows that variations of neutron flux at moon poles are not so evident as was expected and predicted earlier from previous experiments and theoretical models [7]. In this study we will present further development of these results.

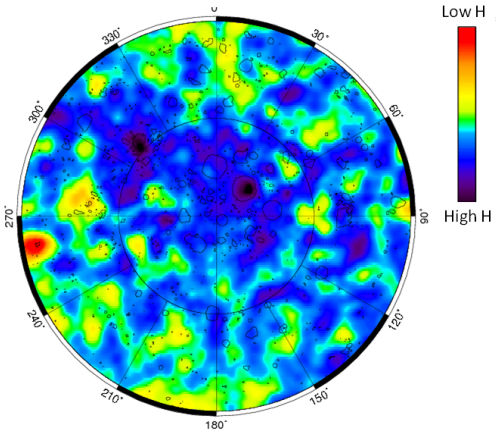

Figure 1. Lunar south pole variations of neutron flux as signature of Hydrogen enhancement measured by LEND instrument onboard LRO spacecraft.

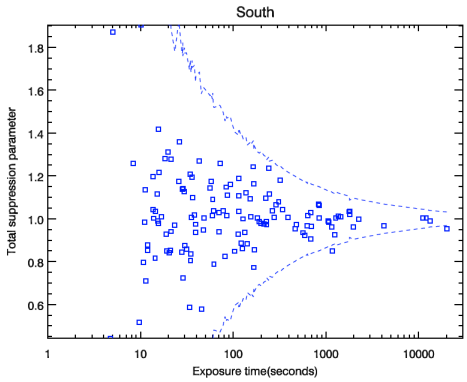

Figure 2. Distribution of southern PSRs by neutron suppression parameter as a function of exposure time. Dash line shows 3 sigma limits of significance.

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